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SCIENCE

NEW YORK, DECEMBER 16, 1892.

A BREATHING WELL IN LOGAN COUNTY, KANSAS.¹

BY J. T. WILLARD, MANHATTAN, KANSAS.

FOR a number of years, Mr. R. L. Smith of Winona has noticed that two wells there blow out air at times and draw it in at other times. He has also noticed a close connection between their action and the weather. One well he has noticed more especially, and became so satisfied that the movement of air was connected with the state of the atmosphere that he called it a natural barometer. He was very anxious that the well should be observed by some scientific man with the necessary instruments. An aneroid barometer was sent him to make observations with, at the same time recording the state of the well. His observations indicated quite clearly that the movement of air in and out of the well was dependent on the pressure of the atmosphere. As the case seemed interesting, the writer visited the well, taking with him an excellent mercurial barometer and such other apparatus as seemed likely to be useful.

The well was found to be a bored one, cased with lumber. It was about eight inches in diameter. Water is reached in this region at about 130 feet, but this particular well has been drilled much deeper. This fact has no influence on the blowing of air, however, as other wells in the vicinity not over 135 feet deep show the same phenomenon. The well is abandoned now, on account of machinery having been lost in it, which interferes with its use.

On reaching the well, the writer first sealed the top, by means of mortar and plaster of Paris, air-tight, inserting a one-fourth-inch brass tube to connect the well with a gauge. The gauge consisted of a simple U-tube of glass, bent so that the two limbs were side by side. The bend of the tube and for several inches up was filled with water, and a scale behind the glass tubes measured any difference in height between the two columns of water. On connecting this gauge with the well, if air had been blowing out, its tension was measured by the height to which the water in the outer limb rose above that in the inner. If, on the contrary, air was being drawn into the well, on attaching the gauge, the water would stand higher in the inner limb. The following abstract from the observations made during four days will serve to show the connection between the movement of air to and from the well, and the fluctuations of the barometer:—

Date.	Time.	Barometer in millimeters.	Gauge in millimeters. ²
Aug. 27	4.30 P.M.	674.15	29
" "	5.30 "	673.75	28
" "	6.30 "	673.65	23
" "	7.55 "	673.60	21
" "	9.00 "	673.70	16
" 28	6.15 A.M.	674.30	0
" "	7.45 "	674.35	1
" "	8.45 "	674.15	2
" "	9.35 "	674.45	0
" "	8.45 P.M.	678.50	— 31
" 29	7.25 A.M.	681.15	— 33
" "	8.30 "	681.55	— 31
" "	10.00 "	681.90	— 30
" "	11.30 "	681.90	— 24
" "	1.00 P.M.	681.65	— 17
" "	3.40 "	681.40	— 10

¹ Read before the Kansas Academy of Science, Oct. 13, 1892.

² The minus sign indicates a drawing-in of air, the water standing higher in the inner limb of the gauge.

The observations made showed conclusively that, the air of the well being stationary, if the barometer fell, the air of the well at once exerted a pressure outward, as shown by the water-gauge. Should the barometer then remain stationary, the tension of the air of the well became gradually less until equilibrium was again established. As this well was closed by the gauge, the evidence was conclusive that the tension was relieved by the escape of air from other openings, probably neighboring wells. Equilibrium being established, should the barometer rise, the gauge showed that the tension of the air of the well was less than that of the atmosphere, and this inequality was corrected by an inflow of air. If, after a fall of the barometer, a rise should ensue, before equilibrium was established, the gauge would still show a greater internal tension. The well was therefore less delicate than the barometer, because of the interval of time required for the necessary movement of the air. After a sudden and considerable change of the barometer a strong movement of air to or from the well would be caused, and this movement would continue for some hours, even though the barometer might be returning to its original height.

These wells doubtless tap a subterranean reservoir of air, probably filling the interstices of sand or gravel beds. When the pressure of the external air is diminished, some of this imprisoned air escapes, and the greater the fall of the barometer, the greater the force with which the air is expelled. My friend Mr. Smith utilized this air-current to blow a whistle which could be heard all over the town, warning the inhabitants of a possible storm. With a rising barometer, caused by an increase in the pressure of the air, air would be forced back into the subterranean reservoir. Mr. Smith tells me that when the air is going into the well, the water recedes a certain amount, and that when the air is blowing out, it can be heard bubbling through the water.

SOME ENTOMOLOGICAL FACTORS IN THE PROBLEM OF COUNTRY FENCES.¹

BY F. M. WEBSTER, OHIO AGRICULTURAL EXPERIMENT STATION, WOOSTER, O.

THE subject of country fences has been frequently considered, both as to matters of device and material, by bodies both scientific and otherwise, and from almost every conceivable standpoint, except from that of an entomologist. As a rule, man will utilize for the purpose of constructing fences whatever available material may be the most abundant in his locality. In New England, where rocks are nearly everywhere over-abundant, the stone-wall will probably predominate in future. On the prairies of the west, where rock is a valuable material and timber equally so, a fence of living trees or shrubs, which can be planted, or one composed largely of iron, will occupy a position similar to the stone-wall of the eastern States. In the south, where timber is abundant, we may still look for its extravagant use, in the old Virginia worm fence composed of rails. To this, however, there are some exceptions. In Louisiana and portions of the south, barbed wire is largely used, for the reason given me by a Louisiana planter, viz., that the improvident negro cannot carry it away for fuel.

There is no denying the fact, that some of these forms of fences are harborers of a vast number of insects. In this respect the old worm-rail fence, with its wide margin of neglected ground on each side, stands probably at the head, followed closely by the stone-wall and hedge. A fence that has been very popular over a large portion of the country lying between the Alleghenies and longitude 97° west, is composed of posts and boards, the former set at distances of from six to eight feet apart, the latter, from

¹ Read before the Biological Society of Washington, Nov. 19.